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The Excedrin Headache of ASW: From U-boats to the New Boats

by

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A paper submitted to the Faculty of the Naval War College in partial satisfaction of the requirements of the Department of Joint Military Operations.

The contents of this paper reflect my own personal views and are not necessarily endorsed by the Naval War College or the Department of the Navy.

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ABSTRACT

The Excedrin Headache of Anti-Submarine Warfare:

From U-Boats to the New Boats

US forces today are under-trained in antisubmarine warfare, at a time when the world conventionally powered submarine base is at an all-time high. The conventional submarine poses a unique and potent threat to US forces, particularly in the littoral regions where ASW is the most difficult. The lessons of World War II, in which German U-boats inflicted great damage and caused a disproportionate diversion of Allied ASW assets, and the inability of British forces to detect the single Argentine submarine San Luis in the Falklands War underscore the relevance of proper planning to deal with the submarine threat in today's joint littoral warfare arena. The approach taken by JTF and Maritime Component staffs in countering the conventional submarine is critical in the success of the maritime forces achieving dominance as an enabling force in the joint littorals.

The problem of countering an adversary's submarines in the littoral regions has quietly, without fanfare, become an unsettling challenge with disturbing ramifications on the efficacy of joint warfighting today. Anti-submarine warfare (ASW) is not a new ball game, but just as any professional sports team loses its proficiency due to lack of practice, U.S. ASW skills have atrophied from insufficient training in the post-Cold War years. To compound this problem, the latest ASW scenario differs from the Cold-War, blue-water, nuclear-powered one in two distinct ways: the littoral waters are shallow and acoustically irregular, and the submarines are mostly non-nuclear, conventionally powered. While any submarine, nuclear or conventional, is formidable, the size of the world's conventional submarine base is immense. Today, some 44 countries--compared with 19 only 40 years ago--operate over 400 conventionally powered submarines (CPSs), an all-time high.[1]

Submarines since World War I have well earned the respect of their opponents, particularly during World War II when a relatively small German U-boat force crippled Allied shipping and nearly gained maritime battlespace dominance over a much more powerful Allied naval force. It would seem that the costly lessons learned from dealing with the U-boats, coupled with more recent Cold War

[1] Andres Delionis, "Anti-Submarine Warfare in the Third World," Jane's Intelligence Review, April 1994, 188.

experiences in countering former Soviet-bloc submarines, would have firmly established an enduring ASW foundation in U.S. force capabilities. However, in actuality this once masterful ASW force is today a shadow of its former self, due primarily to diminished ASW training. The potential of a country such as North Korea to employ its diesel submarines to degrade U.S. mobility, inhibit maritime maneuver, diminish force protection, restrict freedom of action, and divert ASW assets in a regional conflict merits the full attention of Joint Task Force (JTF) planners. The operational art employed to defeat such an adversary's submarine threat, especially in the earliest stages of a regional conflict, will determine success or failure in achieving maritime battlespace dominance as an enabling force in the joint littoral arena.

History--reach out and touch it. From strategic and operational vantage points, there are striking parallels for today's planners to be drawn from the Germans in World War II and the Argentines in the Falklands War. Both offer unique and valuable insights into CPS operations in war. Any current war planners who doubt, or fail to recognize, the potency of CPS forces might travel "back to the future" for reality checks:

-German *tauchboot* (U-boat) operations. Admiral Doenitz thought innovatively. He translated unconventional thinking into operational successes, in the face of staggering odds. Just a few flashbacks illustrate his strategic and operational acumen: Seizing and operating from forward bases in France, to

extend operational reach and reduce his Lines of Operation (LOOs); developing *Rudel* (wolfpack) tactics to optimize command and control and enhance operational firepower; U-boats conducting close-range, night attacks on the surface, for which the British were completely unprepared and suffered 5.5 merchant ships sunk per U-boat at sea in the fall of 1940;[2] and development of the *schnorchel* (snorkel) which enabled ongoing U-boat effectiveness in the littoral regions after May 1943. [3]

Additionally, Admiral Doenitz had correctly targeted Allied shipping and sealift as their operational center of gravity, and only the Allies' breaking of the German code, coupled with superior Allied industrial ship-building capability, eventually defeated the numerically inferior U-boats. Today, with doctrine built upon sealift providing the overwhelming majority (95 per cent in Desert Shield/Storm) of logistics support to U.S. forces in a regional conflict, an adversary would be foolish to avoid targeting sealift assets.

"Don't cry for me..." Move forward in time some 40 years, to 1982. The Falklands War was on, and the Argentines had already lost one of their two operational submarines, the Santa Fe, in a surface attack while attempting to resupply Argentine forces on South Georgia Island. The one remaining submarine, the San Luis, single handedly attracted the undivided attention of some 12 British destroyers and frigates, five attack submarines, and two Seaking

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2 Jack P Mallman Showell, U-Boats Under the Swastika (Annapolis: US Naval Institute Press, 1987), 33.

[3] Karl Doenitz, Memoirs, Ten Years and Twenty Days (Cleveland: World, 1959), 343.

helicopter squadrons for over a month. It roamed, completely undetected by the British, more than 800 miles from its base, penetrated British ASW snares and gained three firing solutions on British ships, discharging three torpedoes in all. [4] Although none of these scored a hit (due to faulty wiring, revealed by post-war testing),[5] it shows how very difficult and force-draining the ASW problem is. If one CPS could actually get three shots off against the British, who arguably were then and are now the best in the world at ASW, is this scenario, or a similar one, relevant to U.S. projections today? *Si, Evita, Si!*

In his article entitled "Navies in War and Peace," Russian Admiral Gorshkov noted that in World War II there were 25 Allied ships and 100 aircraft searching for each U-boat at sea, and a similar disparate allocation of British assets in the Falklands War against only two small conventional submarines.[6] This lesson is the most relevant. No technological advances have emerged which make hard-core ASW significantly less asset-intensive today. ASW today shares a commonality with its past: 95 per cent of it is devoted to searching, and it is still easier to hide than it is to seek!

Context of the threat. Why is the littoral maritime region so difficult? Furthermore, many pose the same line of questioning about the CPS--what's so

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[4] David Brown, The Royal Navy and the Falklands War (Annapolis: US Naval Institute Press, 1987), 157.
[5] Charles H. Wilbur, "Remember the San Luis!" US Naval Institute Proceedings, March 1996, 87.
[6] Bruce W. Watson and Peter M. Dunn, Military Lessons of the Falklands War: View from the United States (Boulder, Co.: Westview Press, 1984), 8.

special about them? Aren't nuclear-powered submarines better? An understanding of these two issues is key to any ASW planning activity.

-You can't hit what you can't see. The CPS has two foremost advantages over nuclear-powered submarines. First, it is extremely quiet in its original stealth mode, i.e., on battery-powered operation. A North Korean Sango-class coastal submarine,[7] for example, is virtually acoustically invisible while on battery. (Yes, quieter than a slow moving nuclear submarine). Passive acoustic sensors only work against it when it either fully surfaces or exposes its snorkel to operate its diesel engine for battery recharging. This cycle of operating on battery most of the time, and the need to occasionally recharge, makes the CPS acoustically silent most of the time. When it is forced to light off its diesel engine, it is quite vulnerable acoustically; hence, it restricts this mode to a small portion of the time, likely at night and in littoral maritime areas of acoustic confusion to avoid detection.

-Where's the PING-PING? All we hear is PING... Secondly, the CPS is much smaller than a nuclear submarine, and presents much less of a target to active acoustic sensors. Additionally, anechoic rubber coatings cover most submarines' hulls today and reduce active SONAR returns by as much as 88 per cent in comparison to an uncoated hull.[8] In addition to being small and coated,

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[7] North Korea has 22 Romeo and 4 Whiskey-class diesel attack submarines, 9 newer Sango-class submarines (and building more), and over 50 YUGO midget submarines. This mix makes for a very capable force designed for covert offensive mining, interdiction of regional shipping, and coastal defense on North Korean ports. Office of Naval Intelligence, Worldwide Submarine Challenges (Washington:1997), 24-28.

[8] Wade H. Schmidt, "Top Torpedo," US Naval Institute Proceedings, March 1993, 131.

most submarines are configured to sit on the bottom, where they are indistinguishable from rocks, sea mounts, or wrecks. Given these parameters, active sensors are seriously degraded against a CPS.

-The littoral seas, ASW's worst nightmare. As though a difficult target is not hard enough, the shallow-water littorals easily double or triple the degree of difficulty in finding and countering a submarine. Higher noise levels from surface traffic, biologics, and wave interactions exist there. Irregular bottom topography degrades the bottom-bounce sound path. Wrecks, obstructions from dumping, and other man-made objects can cause false active sonar targets. Convergence zones and deep sound channels are absent entirely. Tidal currents, salinity aberrations, and pronounced temperature variations throw off acoustic and non-acoustic ASW sensors.[9] Add to these factors the threat to ASW forces of shore-based missiles, mines, and fixed bottom installations (which seem to be finding an expanding worldwide market)[10] and the challenge takes on an even uglier demeanor.

But a covert, submerged adversary feeds on this environment, because it is familiar to and favors the subsurface vessel. A submarine can use these advantages to gain surprise and deliver unexpected operational fires to interdict sealift shipping or target High Value Units (HVUs). The net effect of such attacks

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[9] Brian Longworth, "New Currents Pull Undersea Warfare," Jane's Navy International, June 1995, 18.

[10] Sharon Denny and Phillip Finnegan, "Market Emerges for Seabed Surveillance," Defense News, March 24-30, 1997, 4.

could temporarily halt sea-based operations until the enemy submarine(s) are located and neutralized. This takes time, surrenders maritime space, and risks danger to own forces while potentially restricting the progress of littoral land forces who rely on the enabling support of the maritime component.

Approaching the ASW threat. ASW, like operational art, is not a science. It is only natural that opinions vary as to the level of threat posed by submarines, and the schemes to deal with it. Three alternative approaches seem to exist:

1. Wholesalers. These acknowledge the (potential) capabilities of CPS forces, but generally discount their effectiveness due mainly to lack of training. The business of operating a submarine is labor-intensive and demands skills which are perishable if not frequently refreshed. Why devote large numbers of ASW assets to counter these ineffective submarines; simply taking prudent measures such as avoiding them should be enough. This will free up assets for other, non-ASW missions.

2. Traditionalists. A second (larger) camp assesses the CPS as formidable, but constrained by the same irregularities of the littoral seas which thwart the ASW efforts of friendly forces. So, a CPS force may be capable in peace time, in spite of limited training, but in a real conflict will flounder due to the inherent demands of submarining in an ultra-stressed, opposed environment. Familiar approaches advocated to counter this threat include using speed to advantage, avoiding enemy submarines, and convoy protection--the "old standby" remedies.

3. Realists. These see a unique threat, and want others to see it, too. They view a CPS force as a powerful enemy capability, one that merits graduate-level thought to effectively counter. They recognize own vulnerabilities to this threat, and advocate careful, rational backwards planning approaches to defeat it.

Camp number three is favored. The wholesalers are unwise to dismiss enemy capabilities, and the lessons of historical ASW argue against their school of thought. The traditionalists' biggest flaw is projecting that in a conflict, things will happen as they have in nearly all recent exercises involving U.S. forces, i.e., that ASW will play only a marginal role. Hence, they argue, the usual remedies should work. But this line of reasoning is based on results of flawed exercise scenarios. Camp number three sees problems with the structure of these exercises, and estimates that in a regional conflict, ASW will be unlike the limited training scripts and will demand a great deal from planners and warfighters.

How to get and hold the edge. Current U.S. doctrine stresses control of the littorals as the best areas from which to start, sustain, and support joint operations.[11] "Our ability to dominate the littorals, including the undersea environment..." and to defeat "enemy area sea denial threats and keep vital sea and air lanes open..." are embedded foundations considered crucial to enabling further joint operations over land.[12] How to ensure the CPS threat is not allowed

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[11] John M. Shalikashvili, Joint Pub 3-0: Doctrine for Joint Operations (Washington: 01 February 1995), IV-17.

[12] Jay L Johnson, Forward...From the Sea: the Navy Operational Concept (Washington: 1997), 6.

to interdict will rely on the successful integration of several key considerations and assumptions by JTF and maritime component planners.

1. Recognize the complexity of ASW, and the relative undertraining of U.S. forces in recent years. Confessing this may not lead to immediate absolution, but denying the truth about these skill levels will only beget weaker strategies.

2. Consider susceptibility to CPS attack as an own force operational weakness. Inflated estimations of U.S. capabilities in this area will only further advantage an adversary submarine force. Technology does offer hope here, and a prudent adversary might credit U.S. forces with very powerful ASW capabilities based on the latest ASW tools. However, U.S. planners are best advised to be more pragmatic. Technology is not the panacea for effective ASW; synchronization and careful coordination of numerous force elements, primarily naval, play the largest role. This task is much more demanding when training is lacking.

3. Recent benign sea environments have clouded the threat posed by CPS forces. No current CINC has had a JTF opposed by hostile submarines, because none of the recent conflicts involving U.S. forces has included a credible submarine threat.[13] It is important to avoid script-writing this "sail the friendly seas" scenario into a potential regional conflict such as one involving the Korean peninsula.

4. Respect the potency of submarine threats. Even poorly trained CPS crews are deemed capable of inflicting operational fires, because the environment so favors

[13] W. J. Holland, "ASW is Still Job One," US Naval Institute Proceedings, August 1992, 32.

them. The Argentine crew of the San Luis was newly assembled and poorly trained, yet penetrated British forces thrice and emerged unscathed. CPS forces can lay mines and fire torpedoes. While reasonable to assume better trained crews possess more proficiency, history clearly reveals that an immense advantage belongs to any submarine simply due to its stealth and the natural cloak of the littoral oceans.

5. Avoid mirror-imaging of an adversary's CPS force employment strategies. The U.S. Navy no longer operates diesel submarines, and recent U.S. ASW training has been largely with its own nuclear submarines. Hence, the little ASW practice which has occurred has lacked specificity and reinforced ASW techniques unique to countering nuclear submarines.

Additionally, CPS forces are ideal for conducting state-sponsored terrorism, and employment of conventional submarines in unconventional ways may well be the rule which drives an enemy's strategies and tactics. Methods may include attacking U.S. commercial shipping or stealth mining of key transit lanes or ports to reduce U.S. forces' operational reach--perhaps prior to any announcement of hostilities. "Outside the box" thinking is essential on the part of JTF planners. What if portions of an enemy submarine force simply get underway and submerge? What about a marginally-capable submarine being suddenly removed from the intelligence picture by scuttling, thus becoming unaccounted for? Will U.S. intelligence sources be alert to these types of actions? U.S. planners are

unaccustomed to such measures and may be disinclined to consider that an adversary would resort to them.

6. Expect that the ASW effort will demand inordinately high numbers of assets to counter the CPS. There is no surprise here when the actualities of historical conflicts involving submarines are taken into account. But the non-hostile subsurface nature of recent conflicts, combined with unrealistic exercise regimes, has spawned the notion that fewer rather than larger numbers of assets will be required. The devoting of large numbers of force assets for ASW, and the subsequent reducing of forces for other missions, including operational reserves, is a much more likely case.

7. A related consideration is that effectiveness in ASW simply cannot be developed swiftly. The relatively high ASW proficiency levels enjoyed by U.S. forces during the Cold War reflected the culmination of decades of combined, dedicated expertise. The current lower levels of ASW skill similarly reflect limited training and will not be improved quickly. Particularly in a regional or limited conflict, the ASW forces will likely not improve during the course of the campaign. Planners are wiser to discount any appreciable maturing of ASW skills in such a scenario. Hence it will be important to complement the ASW forces by accentuating related elements, such as intelligence; simplicity, speed, and reliability of command, control, and reporting; and operational maneuverability of HVUs to avoid known or best estimated postions of enemy submarines.

8. The above factor--time required to improve skill levels--argues against attempting new adventures in jointness to perform ASW. Some have argued, citing the joint Royal Navy and Royal Air Force efforts of World War II, that joint force employment is the option of choice in ASW. [14] Developing effectiveness in joint warfighting requires time, a factor which was on the side of the Allies in World War II. The merits of joint-force shaping in ASW deals with futurity; for now and the near term ahead it is best left as primarily a naval mission. ASW has not been exercised jointly by U.S. forces and planners do well to maximize known capabilities, particularly in a relatively short-duration conflict.

9. Intelligence regarding all aspects of an adversary's submarine order of battle becomes all the more important given the inherent disadvantages with which ASW forces commence and pursue their mission. Intelligence optimizing (breaking the German code) for the Allies in World War II is credited with having turned the conrner in finally defeating the U-boats and saving numerous Allied ships. Efforts at developing all-source intelligence packages designed to maximize the known factors, including enemy capabilities and intentions, will be well spent. Here is one area where joint efforts, from all intelligence agencies and sources, can be shared for developing the most accurate and timely data bases.

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[14] Bruce R. Linder, "The Future of Joint ASW," US Naval Institute Proceedings, September 1995, 66.

10. The political expense of even a single U. S. ship lost to enemy submarine attack may rapidly sour American public opinion on U.S. forces' involvement in a limited conflict.[15] Especially if the loss is a HVU, such as an aircraft carrier, large amphibious ship, or a sealift vessel, and it occurs early in the conflict, Americans would likely not tolerate the loss very well. Unfortunately, this perception exists due to the unprecedented success enjoyed by U.S.-led coalition forces in 1991 against Iraq. In an unlimited war against a pre-eminent world power, such losses could probably be expected, but they become show stoppers in smaller scale conflicts against lesser powers. Planners are smart to recognize that the ASW stakes are very high, and that all practical means to avoid even a single ASW-related casualty constitutes a reasonable goal.

11. Targeting of enemy submarines' command and control (C2) infrastructure, even logistics and repair facilities, merits attention, especially if initial ASW efforts prove unproductive and the conflict is protracted. Any submarine force relies heavily on these facilities, particularly its C2 elements. Information warfare involves advantaging own forces and denying enemy access to information. Herein lies the other ASW-related mission which could involve non-naval forces, e.g. insertion of Special Operations Forces or aerial bombing of these facilities ashore. This option is likely not one of first resort, because attacking of facilities ashore is customarily viewed as far more escalatory than countering forces at sea or in the sky. Its use is more appropriate as the duration and intensity of the

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[15] DeLionis, 190.

conflict increase. Offensive mining of enemy ports is also a viable option which can freeze submarines in port and screen others from getting in.

12. Planners can enhance force protection by recognizing the inherent advantages of speed and positioning in the maritime anti-submarine scenario. CPSs are restricted to slow speeds while operating on battery, and judicious use of speed and maritime positioning increase the odds of avoiding a conventional submarine. There is an old ASW trap here, however: assuming once swept, always swept. Sanitizing an area as submarine-free is only a very temporary certification against a CPS. A skilled CPS will likely seek areas already swept by ASW forces, knowing they are not prone to look there again.

Summary--don't sell them short. In the final analysis, ASW is most appropriately viewed as the single most complex area in which U.S. forces will be involved. Because of this complexity, the CPS forces of a potential adversary constitute a very real danger not only directly to U. S. naval forces and sealift ships, but also indirectly to the effectiveness of continental power-projection forces which rely on sea-borne logistics and sea-based air and firepower support. Prior untarnished success in the Arabian Gulf has framed the expectation of future maritime sealift integrity--an inflated, but very real expectation.

There are more sound reasons for applying the vivid lessons of history and adopting a calculated approach to ASW than there are bases for marginalizing the CPS threat in a regional conflict. There is good reason to respect any submarine threat and prepare for unrehearsed--but not unanticipated--ASW operations of an

order of magnitude larger than has occurred since World War II. Even given a limited war scenario, ASW planning and execution will tax decision makers and forces to the limit. The ultimate success of these efforts rests on the proper combining of numerous elements and considerations, and not upon any single idea or tactical innovation. Defeating the CPS threat is likely to be both time- and asset-consumptive, while attracting the fullest measure of operational intellect on the part of both JTF and maritime component staffs.

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